

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A drill bit for forming a borehole through an earthen formation, the drill bit comprising: a housing including an upper end, a lower end, an axis defined as extending through the upper end and the lower end and a bore extending parallel to the axis into the lower end; a mandrel slidably disposed in the bore, the mandrel having a lower end and an upper end; a centre cutter face on the mandrel lower end; an arm having a lower end and connected by a pivotal connection to the housing adjacent the bore, the arm being radially moveable by rotation about the pivotal connection between a stored position and an expanded position, the arm being drivable into the expanded position by the mandrel bearing thereagainst to drive the arm out; and an outer cutter face on the arm lower end.
2. The drill bit of claim 1 further comprising a slot in the housing in which the arm is mounted.
3. The drill bit of claim 2, wherein the slot is formed to conform about the arm side and upper surfaces to support the arm and provide for transfer of stress into the housing.
4. The drill bit of claim 2 wherein the slot is open to the end of the housing.
5. The drill bit of claim 2 wherein the slot is spaced from the end of the housing.
6. The drill bit of claim 1 wherein the center cutter face and the outer cutter face form a substantially continuous bit surface when the arm is in its expanded position.
7. The drill bit of claim 1 further comprising fluid jetting ports through which fluid can be passed for cleaning and lubricating the bit.
8. The drill bit of claim 7 wherein the fluid jetting ports open to the center cutter face.
9. The drill bit of claim 8 further comprising a channel on the center cutter face for conveying fluid from the fluid jetting ports outwardly toward the outer cutter face.

10. The drill bit of claim 9 further comprising an outer channel on the outer cutter face arranged to communicate with the channel on the center cutter face, the outer channel selected to convey fluid along the outer cutter face.

11. The drill bit of claim 1 further comprising a hydraulic drive chamber between the housing and the mandrel, the hydraulic drive chamber formed to accept hydraulic fluid pressure to drive sliding movement of the mandrel along the bore of the housing.

12. The drill bit of claim 11 wherein the mandrel includes an inner bore for conveying fluid therethrough, a port from the mandrel inner bore to the hydraulic chamber and a restriction nozzle in the mandrel inner bore.

13. The drill bit of claim 1 wherein the arm includes cutters on its side surface extending from its outer cutter face.

14. The drill bit of claim 1 wherein the housing and the arm are formed to limit the radial outward movement of the arm.

15. The drill bit of claim 1 wherein the arm is a first arm and the drill bit further comprises a second arm spaced circumferentially on the housing from the first arm and the second arm is radially moveable with the first arm relative to the housing between a stored position and an expanded position, as driven by the mandrel bearing thereagainst.

16. The drill bit of claim 1 further comprising a releasable lock to releasably lock the mandrel against sliding movement within the bore.

17. The drill bit of claim 1 wherein the mandrel and the housing are formed to interengage such that rotation of the mandrel drives rotation of the housing.

18. A drill bit for forming a borehole through an earthen formation, the drill bit comprising: a center cutter face; an arm positioned about the center cutter face and selected to be radially moveable relative to the center cutter face between a stored position defining a stored bit diameter and an expanded position defining an expanded bit diameter, greater than the stored bit diameter; and an outer cutter face disposed on the arm and selected such that when the arm is in the expanded

position, the outer cutter face and the center cutter face are substantially continuous and co-planar.

19. The drill bit of claim 18 further comprising a hydraulic drive chamber between the housing and the mandrel, the hydraulic drive chamber formed to accept hydraulic fluid pressure to drive sliding movement of the mandrel along the bore of the housing.

20. The drill bit of claim 18 further comprising a slot in the housing in which the arm is mounted.

21. The drill bit of claim 20, wherein the slot is formed to conform about the arm side and upper surfaces to support the arm and provide for transfer of stress into the housing.

22. The drill bit of claim 18 further comprising fluid jetting ports through which fluid can be passed for cleaning and lubricating the bit.

23. The drill bit of claim 22 wherein the fluid jetting ports open to the center cutter face.

24. The drill bit of claim 23 further comprising a channel on the center cutter face for conveying fluid from the fluid jetting ports outwardly toward the outer cutter face.

25. The drill bit of claim 24 further comprising an outer channel on the outer cutter face arranged to communicate with the channel on the center cutter face, the outer channel selected to convey fluid along the outer cutter face.

26. The drill bit of claim 18, wherein the drill bit is formed for connection to a drilling drive means to which the upper end is connectable is selected from the group consisting of: a drill string; a sub connectable to a drill string; a downhole motor or a sub connected to a downhole motor.

27. The drill bit of claim 18, further comprising fluid jetting ports through which fluid can be passed for cleaning and lubricating the bit.

28. The drill bit of claim 18, wherein the bit is selected to be a size suitable for passing though the drift diameter of a tube string

29. The drill bit of claim 18, wherein in the expanded position, the bit is selected to be capable of use to drill a bore hole of a gauge greater than the outer diameter of a tube string through which it has been tripped.

30. The drill bit of claim 18, wherein the outer cutter face and the center cutter face include cutters selected to be useful in forming a borehole through an earthen formation.

31. The drill bit of claim 18 further comprising: a housing including an upper end, a lower end, an axis defined as extending through the upper end and the lower end and a bore extending parallel to the axis and through the lower end; and the center cutter face is disposed on a mandrel slidably disposed in the bore, the mandrel having a lower end and an upper end; and the arm being drivable into the expanded position by the mandrel bearing thereagainst to drive the arm out.

32. The drill bit of claim 31 wherein the mandrel is formed to support the arm in the expanded position.

33. The drill bit of claim 31 wherein the arms extend into the bore when in the stored position.